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16 ABSTRACT

Adult pinfish, Lagodon rhomboides, were collected during September and October, 1974 and 1975. Following a minimum of one week holding period, females were initially injected with 200 IU human chorionic gonadotropin and injected with 400 IU every second day thereafter until mature ova (0.90-0.93 mm diameter) were produced. Ova were artificially fertilized and the embryonic period (sensu Balon, 1975) described and illustrated. Emergence occurred 48 hr after fertilization at 18°C and eye pigmentation appeared 144 hr after fertilization. Larval total length at emergence was 2.3 mm; at 96 hr post-emergence, 2.7 mm; and at 120 hr post-emergence, 2.5 mm. Decrease in length and death of larvae after 96 hr post-emergence was probably due to malnutrition and subsequent infection.

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Biological Sciences

NOTES ON THE EMBRYONIC PERIOD OF THE PINFISH *LAGODON RHOMBOIDES* (LINNAEUS)[1]

STEVEN C. SCHIMMEL

U. S. Environmental Protection Agency, Environmental Research Laboratory, Gulf Breeze, Florida 32561

ABSTRACT: *Adult pinfish,* Lagodon rhomboides, *were collected during September and October, 1974 and 1975. Following a minimum of one wk holding period, females were initially injected with 200 IU human chorionic gonadotropin and injected with 400 IU every second day thereafter until mature ova (0.80-0.93 mm diam.) were produced. Ova were artificially fertilized and the embryonic period (sensu Rahn, 1975) described and illustrated. Emergence occurred 48 hr after fertilization at 18°C and eye pigmentation appeared 144 hr after fertilization. Larval total length at emergence was 2.1 mm, at 96 hr post emergence, 2.7 mm, and at 120 hr post emergence, 2.5 mm. Decrease in length and death of larvae after 96 hr post emergence was probably due to malnutrition and subsequent infection.*

[1] Contribution No. 181, Environmental Research Laboratory, Gulf Breeze.

Pinfish are abundant along the Atlantic and Gulf coasts of the United States. The life history distribution and ecology are well described (Hildebrand and Cable, 1930, 1934; Reid, 1954; Caldwell, 1957; Springer, 1957; Hansen, 1969; Camron, 1980). Pinfish are believed to spawn in oceanic waters off the Atlantic and Gulf coasts during the autumn and winter months. Although spawning of the pinfish has never been observed, Springer (1957) reported a school containing specimens with ripe gonads in 31 fathoms of water off the Mississippi coast. Ova and recently hatched larvae (< 5 mm) have never been described from nature. I undertook to force pinfish spawning artificially in the laboratory, using human chorionic gonadotrophic hormone as a stimulant, and to describe the embryonic period of the pinfish.

Methods and Materials—Adult pinfish (> 100 mm SL) were collected from Santa Rosa Sound, Florida in September and October, 1974 and 1975. They were held in sea water (14-22°C, 16-28 °/$_{oo}$) for at least one week prior to hormonal injection. Fish were fed frozen adult brine shrimp (*Artemia salina*) daily throughout the laboratory tests. Males were distinguished from females on the basis of presence or absence of milt after gentle squeezing of the lateral surfaces of the fish anterior to the vent.

Females were anesthetized with MS-222 and given a 200 IU intraperitoneal injection of human chorionic gonadotrophic hormone (HCG) and 400 IU injections every second day thereafter until mature ova were produced. Mature ova (clear spherical, 0.90-0.93 mm diam) were stripped from the fish by applying gentle pressure to the abdomen anterior to the vent. Ova were mixed with milt in 100 mm × 100 mm finger bowls that contained 2l of sea water (18°C, 28 °/$_{oo}$) and incubated at 18°C for 30 min to permit fertilization to occur. The embryonated ova suspended in the water column were gently removed on fine nylon gauze to other 2l finger bowls. Immature and infertile ova sank to the bottom of the finger bowls. Approximately 100 embryos were placed in each bowl. Finger bowls remained in the incubator at 18°C, except for daily checks on development and removal of dead embryos. A 10 hr daylight: 14 hr darkness photoperiod was maintained throughout the tests. Development during the embryonic and early larval periods was monitored from fertilization until death occurred. Developmental stages photographed ranged from unfertilized ova to protopterygiolarvae 6 days old. Names of periods and phases follow usage of Balon (1975).

Several foods were supplied the pinfish after eye pigmentation was complete. Among these were raw plankton (< 85 µm), ciliate protozoa (*Uronema nigricans*, strain P.), brine shrimp nauplii, barnacle nauplii (*Balanus* sp.) and rotifers (*Brachionus plicatilis*).

Results and Discussion—Pinfish were highly variable in their response to hormonal injections. No fish given less than 800 IU of HCG hormone produced mature ova. The avg amount required for positive response was 1,000 IU, although many fish produced no mature ova even after 3,000 IU were injected. Those that did produce were not as obviously distended as croakers injected by

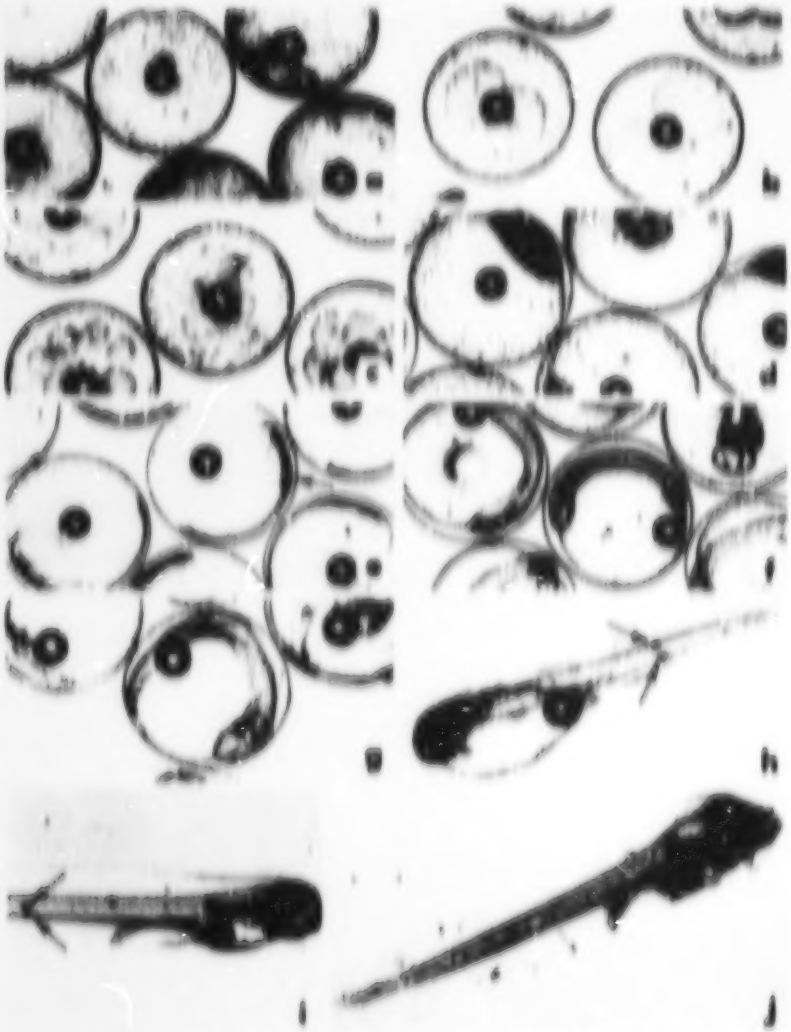

Fig. 1. Cleavage, embryonic, eleutheroembryonic and early protopterygodarval phases of pinfish (*Lagodon rhomboides*) incubated at 18°C ± 1°C. All figures are 35 ×. Unfertilized ova with single oil globule. b. Cleavage, 2- and 4-cell stage. 0 hr 45 min. c. Cleavage, 8-cell stage. 1 hr 0 min. d. Late blastula. 8 hr 12 min. e. Gastrulation. 13 hr 45 min. f. Gastrulation complete, formation of brain, somites and eye vesicles. 34 hr 30 min. g. Embryo prior to emergence. 48 hr 05 min. h. Pinfish eleutheroembryo 2 hr after emergence, little eye pigmentation and melanophore on lateral surfaces of tail (arrow). i. Eleutheroembryo above 24 hr after emergence, greatly reduced yolk sac, melanophore still evident (arrow). j. Protopterygodarval phase, 96 hr after emergence, fully pigmented eyes and well developed jaw apparatus, melanophore has disappeared.

Middaugh and Yeakum (1974), but overripe ova were observed from pinfish that were not stripped daily.

Development of the embryo was rapid, emergence occurring after 48 hr incubation at 18 C (Fig. 1 a-j). The emergent eleutheroembryo (2.3 mm total length) was without eye pigmentation, lacked a characteristic melanophore on both lateral surfaces approximately 1 mm from the tip of the tail. The melanophore disappeared by the time of eye pigmentation (48 hr post-emergence). During yolk absorption, the larvae grew to approximately 2.7 mm. After yolk absorption, the jaw apparatus developed extensively and the total length of the protopterygiolarva increased to approximately 2.9 mm 96 hr after emergence. Approximately 90% of the larvae died within 120 hr after emergence. The length of individuals surviving beyond 120 hr diminished from 2.9 mm to approximately 2.5 mm. No larvae survived beyond 9 days from emergence.

Although food was supplied and feeding activity was seen, no food was found in the gut. Malnutrition and subsequent infection was believed to be the cause of death. Determination of the nutritional needs and feeding habits of pinfish during the period from yolk sac absorption to the juvenile stage will require a more comprehensive investigation.

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LITERATURE CITED

Bacon, E. K. 1975. Terminology of intervals in fish development. J. Fish. Res. Board Can. 32:1061-1070.

Caldwell, D. K. 1957. The biology and systematics of the pinfish, *Lagodon rhomboides* (Linnaeus). Bull. Florida St. Mus. 2:6:1-173.

Copeland, J. W. 1965. Growth, respiratory metabolism and seasonal distribution of juvenile pinfish (*Lagodon rhomboides* Linnaeus) in Redfish Bay, Texas. Contrib. Mar. Sci. 14:19-36.

Hansen, D. J. 1969. Food, growth, migration, reproduction, and abundance of pinfish, *Lagodon rhomboides*, and Atlantic croaker, *Micropogon undulatus*, near Pensacola, Florida, 1963-65. U. S. Fish. Wildl. Serv. Fish. Bull. 68:135-146.

Hildebrand, S. F., and L. E. Cable. 1938. Further notes on the development and life history of some teleosts at Beaufort, N. C. Bull. Bur. Fish. 48:504-642.

Middaugh, D. P., and R. L. Yeakum. 1974. The use of chorionic gonadotropin to induce laboratory spawning of the Atlantic croaker, *Micropogon undulatus*, with notes on subsequent embryonic development. Chesapeake Sci. 15:110-114.

Reid, G. K. Jr. 1954. An ecological study of the Gulf of Mexico fishes, in the vicinity of Cedar Key, Florida. Bull. Mar. Sci. 4:1-94.

Springer, S. 1957. Some observations on the behavior of schools of fishes in the Gulf of Mexico and adjacent waters. Ecology 38:169-171.